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REAPPRAISAL

GREAT EGG HARBOR BAY AREA

1995 - 1999

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REAPPRAISAL

GREAT EGG HARBOR BAY AREA

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New Jersey Department of Environmental Protection
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EXECUTIVE SUMMARY

This report constitutes a Reappraisal report and an update of the Sanitary Survey completed in 1997. The water quality data presented in this Reappraisal Report represents samples collected in the Great Egg Harbor estuary between January 1995 and March 1999. The water quality data was consistent with the existing shellfish growing water classification. Be advised this report is on Area SE3 which was previously referred to as Area SE2.

In 1993 several homes located on Anchorage Point in the area of Ship Channel were connected to the Somers Point Sewage Authority. As a result of intensive monitoring around Anchorage Point 215 acres of water were upgraded in 1997, from *Seasonal* to *Approved*. However, there remained an area directly adjacent to the homes that had been classified *Special Restricted*. Continued monitoring in this area will now allow the Department to upgrade this 38 acre area from *Special Restricted* to *Seasonal* waters.

INTRODUCTION

PURPOSE

This report is part of a series of studies having a dual purpose. The first and primary purpose is to comply with the guidelines of the National Shellfish Sanitation Program (NSSP) that are established by the Interstate Shellfish Sanitation Conference (ISSC). Reports generated under this program form the basis for classifying shellfish waters for the purpose of harvesting shellfish for human consumption. As such, they provide a critical link in protecting human health.

The second purpose is to provide input to the State Water Quality Inventory Report, which is prepared pursuant to Section 305(b) of the Federal Clean Water Act (P.L. 95-217). The information contained in the growing area reports is used for the New Jersey State Water Quality Inventory Report (305b) which provides an assessment to Congress every two years of current water quality conditions in the State's major rivers, lakes, estuaries, and ocean waters. The reports provide valuable information for the 305(b) report, which describes the waters that are attaining state designated water uses and national clean water goals; the pollution problems identified in surface waters; and the actual or potential sources of pollution. Similarly, the reports utilize relevant information contained in the 305(b) report, since the latter assessments are based on instream monitoring data (temperature, oxygen,

pH, total and fecal coliform bacteria, nutrients, solids, ammonia and metals), land-use profiles, drainage basin characteristics and other pollution source information.

From the perspective of the Shellfish Classification Program, the reciprocal use of water quality information from reports represent two sides of the same coin: the growing area report focuses on the estuary itself, while the 305(b) report describes the watershed that drains to that estuary.

The Department participates in a cooperative National Environmental Performance Partnership System (NEPPS) with the USEPA which emphasizes ongoing evaluation of issues associated with environmental regulation, including assessing impacts on waterbodies and measuring improvements in various indicators of environmental health. The shellfish growing area reports are intended to provide a brief assessment of the growing area, with particular emphasis on those factors that affect the quantity and quality of the shellfish resource. As the Department implements a comprehensive watershed management program in conjunction with the NEPPS initiative, the shellfish growing area reports provide valuable information on the overall quality of the saline waters in the most downstream sections of each major watershed. In addition, the reports assess the quality of the biological resource and provide a reliable indicator of potential areas of concern and/or areas where additional information is needed to accurately assess watershed dynamics.

HISTORY

As a brief history, the NSSP developed from public health principles and program controls formulated at the original conference on shellfish sanitation called by the Surgeon General of the United States Public Health Service in 1925. This conference was called after oysters were implicated in causing over 1500 cases of typhoid fever and 150 deaths in 1924. The tripartite cooperative program (federal, state and shellfish industry) has updated the program procedures and guidelines through workshops held periodically until 1977. Because of concern by many states that the NSSP guidelines were not being enforced uniformly, a delegation of state shellfish officials from 22 states met in 1982 in Annapolis, Maryland, and formed the ISSC. The first annual meeting was held in 1983 and continues to meet annually at various locations throughout the United States.

The NSSP *Guide for the Control of Molluscan Shellfish* sets forth the principles and requirements for the sanitary control of shellfish produced and shipped in interstate commerce in the United States. It provides the basis used by the Federal Food and Drug Administration (FDA) in evaluating state shellfish sanitation programs. The five major points on which the state is evaluated by the FDA include:

l. The classification of all actual and potential shellfish growing areas as to their suitability for shellfish harvesting.

2. The control of the harvesting of shellfish from areas that are

classified as restricted, prohibited or otherwise closed.

3. The regulation and supervision of shellfish resource recovery programs.
4. The ability to restrict the harvest of shellfish from areas in a public health emergency, and
5. Prevent the sale, shipment or possession of shellfish that cannot be identified as being produced in accordance with the NSSP and have the ability to condemn, seize or embargo such shellfish.

FUNCTIONAL AUTHORITY

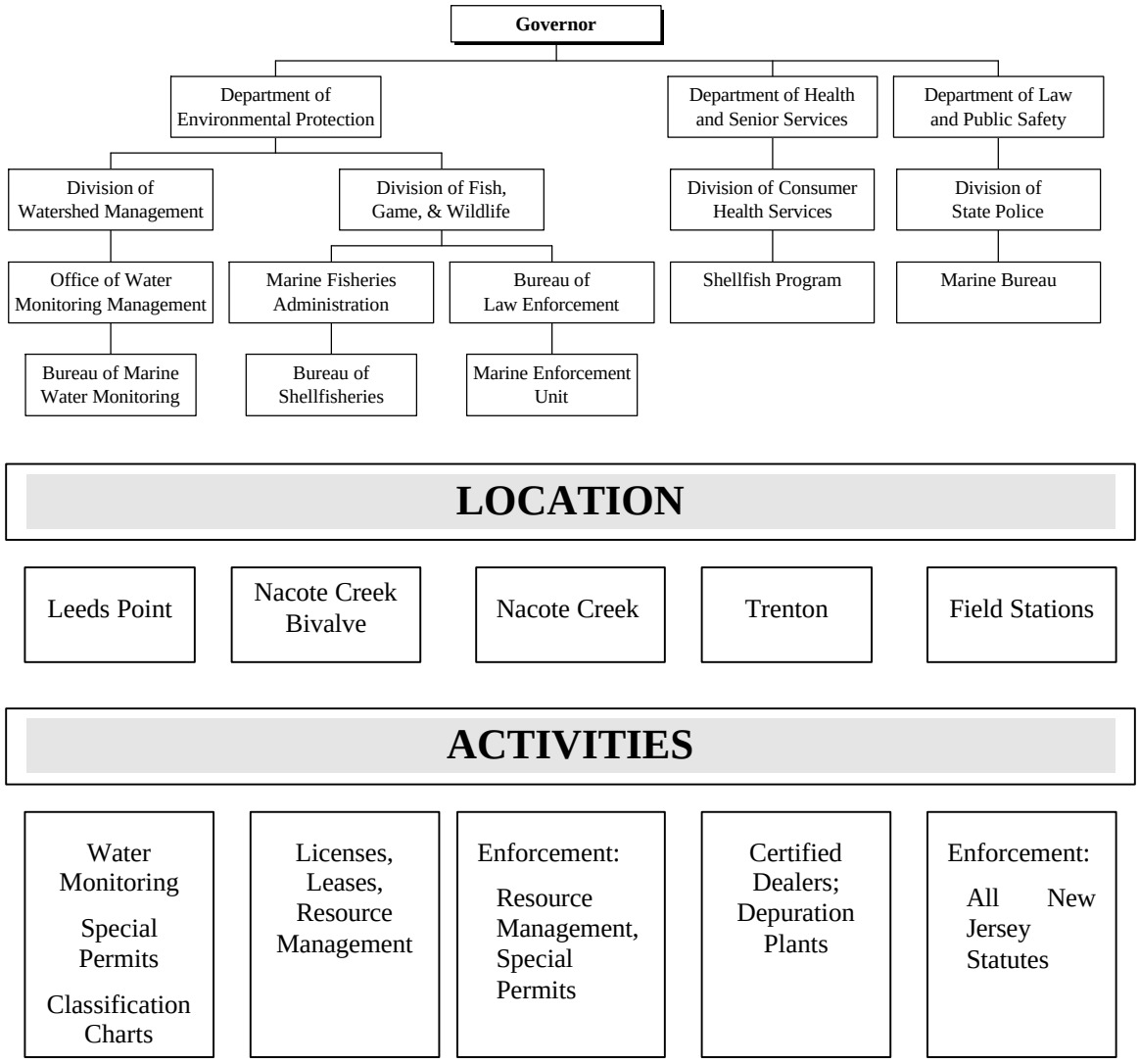
The authority to carry out these functions is divided between the Department of Environmental Protection (DEP), the Department of Health and Senior Services and the Department of Law and Public Safety. The Bureau of Marine Water Monitoring (BMWM) under the authority of N.J.S.A. 58:24 classifies the shellfish growing waters and administers the special resource recovery programs. Regulations delineating the growing areas are promulgated at N.J.A.C. 7:12 and are revised annually. Special Permit rules are also found at N.J.A.C. 7:12 and are revised as necessary.

The Bureau of Shellfisheries in the Division of Fish, Game and Wildlife issues harvesting licenses and leases for shellfish grounds under the Authority of N.J.S.A. 50:2 and N.J.A.C. 7:25. This bureau in conjunction with the BMWM administers the Hard Clam Relay Program.

The Bureau of Law Enforcement in the DEP (Division of Fish, Game, and Wildlife) and the Division of State Police in the Department of Law and Public Safety enforce the provisions of the statutes and rules mentioned above.

The Department of Health and Senior Services is responsible for the certification of wholesale shellfish establishments and in conjunction with the BMWM, administers the depuration program.

FIGURE 1: STATE OF NEW JERSEY SHELLFISH AGENCIES



IMPORTANCE OF SANITARY CONTROL OF SHELLFISH

Emphasis is placed on the sanitary control of shellfish because of the direct relationship between pollution of shellfish growing areas and the transmission of diseases to humans. Shellfish borne infectious diseases are generally transmitted via a fecal-oral route. The pathway is complex and

quite circuitous. The cycle usually begins with fecal contamination of the shellfish growing waters. Sources of such contamination are many and varied. Contamination reaches the waterways via runoff and direct discharges.

Clams, oysters and mussels pump large quantities of water through their bodies during the normal feeding process. During this process the shellfish also concentrate microorganisms, which may include pathogenic microbes, and toxic heavy metals/chemicals. It is imperative that a system is in place to reduce the human health risk of consuming shellfish from areas of contamination.

Accurate classifications of shellfish growing areas are completed through a comprehensive sanitary survey. The principal components of the sanitary survey report include:

1. An evaluation of all actual and potential sources of pollution,
2. An evaluation of the hydrography of the area and
3. An assessment of water quality. Complete intensive sanitary surveys are conducted every 12 years with interim narrative evaluations completed on a three year basis. If major changes to the shoreline or bacterial quality occur, then the intensive report is initiated prior to its l2 year schedule.

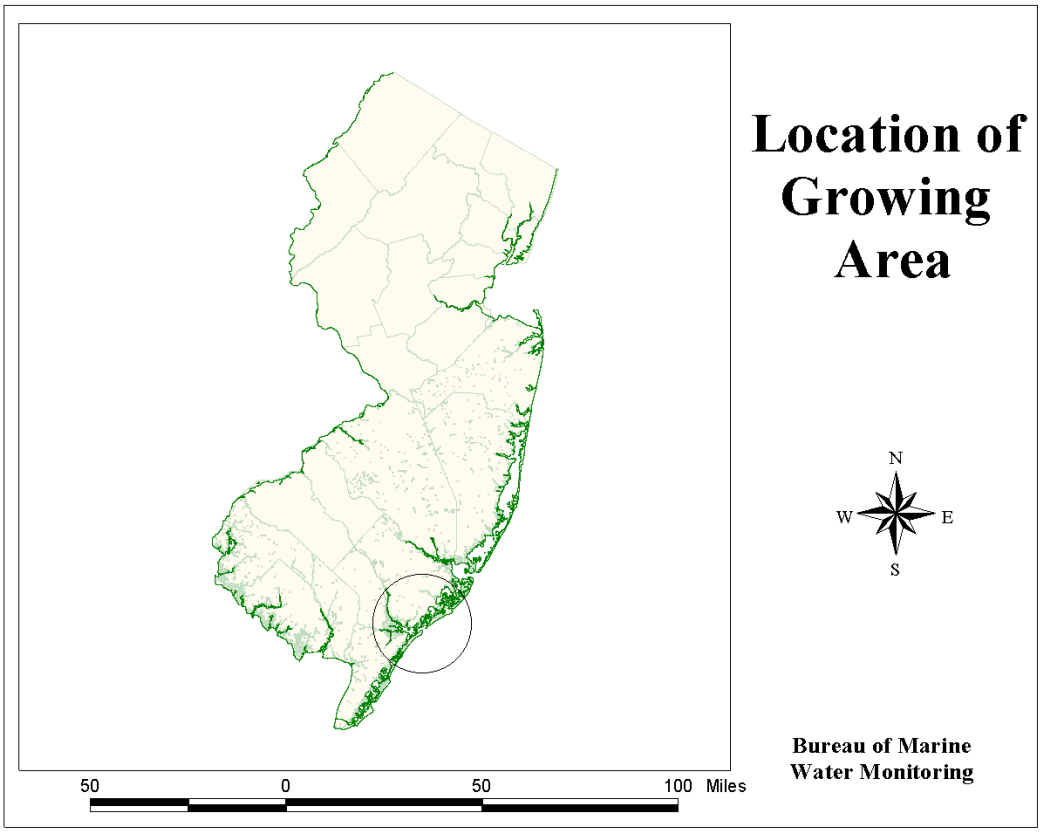
The following narrative constitutes this bureau's assessment of the above mentioned components and determines the current classification of the shellfish growing waters.

DESCRIPTION

LOCATION

The Great Egg Harbor River/Bay is located in portions of Cape May County and Atlantic County and includes waters from Great Thorofare and Lakes Bay to Peck Bay, see Charts #7 and #8 of the State of New Jersey – Shellfish Growing Water Classification Charts. The area of interest for updating the Sanitary Survey is located in Atlantic County at Anchorage Point in Ship Channel. Figure #2 shows the location of this area.

FIGURE 2: LOCATION OF SHELLFISH GROWING AREA : GREAT EGG HARBOR



DESCRIPTION

There are six municipalities that border the waters in this area. However, one of the municipalities is Pleasantville, which only comes in contact with a very small area located by Lakes Bay. Statistics on the five other municipalities can be found in Table 1. Ocean City, Ventnor, Margate and Longport have a large impact on the area from storm drains and non-point source runoff. Some of the major factors affecting water quality are tidal exchange through the Great Egg Harbor Inlet and non-point source pollution from the densely developed barrier islands. As noted in Table #1 the population of these islands increases drastically during the summer. This is a reason for seasonal classifications in the area.

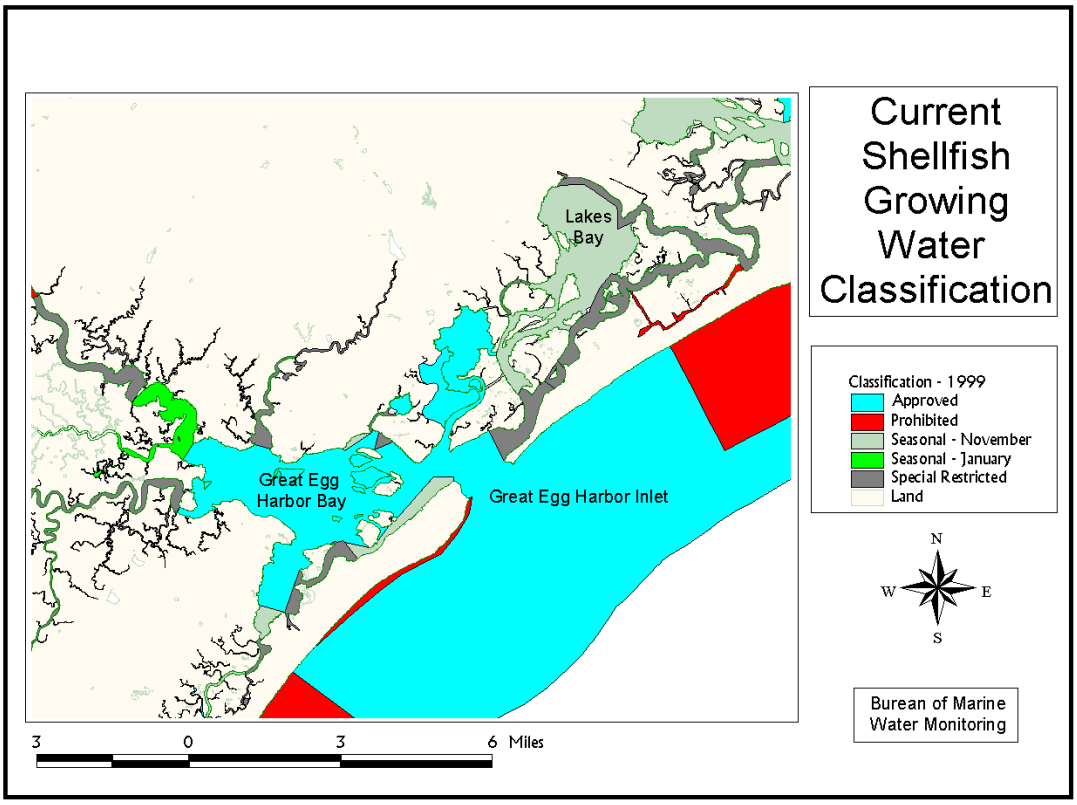
TABLE 1: POPULATION STATISTICS

POPULATION STATISTICS					
Municipalities	Population (Yearround)	Population Density	Population (Summer)	Population Density (Summer)	Area (Square Miles)
Somers Point	11,210	2,256	(NA)	(NA)	4.968
Ventnor	13,000	5,136	28,000	11,062	2.531
Margate	8,431	5,169	25,293	15,507	1.631
Ocean City	15,512	1,359	150,000	13,142	11.413
Longport	1,200	2,097	3,000	5,244	0.572

HISTORY

The last report for this area was a Sanitary Survey dated June 1997. This report covered data from 1993 through 1996. This report recommended for the upgrade of 215 acres of water from *Seasonally Approved* to *Approved*. The area upgraded was located around Anchorage Point. There was a small community of homes located on Anchorage Point by Ship Channel that were connected to the Somers Point Sewage Authority in 1993. As a result of this action the water quality improved, thereby allowing the Department to change the classification from *Seasonally Approved* to *Approved*. Historically, water quality has been consistent with the current classification, (See figure 3). However, with improvements such as the connection of homes previously on septic systems to sewer lines, the water quality has improved.

FIGURE 3: CURRENT CLASSIFICATION OF GREAT HARBOR ESTUARY



METHODS

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 1992).

Approximately 1400 water samples were collected for total and fecal coliform bacteria between 1995 and 1999 and analyzed by the three tube MPN method according to APHA (1970). Figures 6, 7, 8 and 9 show the Shellfish Growing Water Quality monitoring stations in the Great Egg Harbor Estuary. Approximately 164 stations are monitored during each year.

Water quality sampling, shoreline and watershed surveys were conducted in accordance with the NSSP *Guide for the Control of Molluscan Shellfish*, 1997.

Data management and analysis was accomplished using database applications developed by the Bureau. Mapping of pollution data was performed with the Geographic Information System (GIS:ARCVIEW).

BACTERIOLOGICAL INVESTIGATION AND DATA ANALYSIS

The water quality of each growing area must be evaluated before an area can be classified as *Approved, Seasonally Approved, Special Restricted,* or *Seasonal Special Restricted*. Criteria for bacterial acceptability of shellfish growing waters are provided in NSSP *Guide for the Control of Molluscan Shellfish,* 1997. Each shellfish producing state is directed to adopt either the total coliform criterion, or the fecal coliform criterion. While New Jersey bases its growing water classifications on the total coliform criterion, it does make corresponding fecal coliform determinations for each sampling station, these data are viewed as adjunct information and are not directly used for classification. The State Shellfish Control Authority also has the option of choosing one of the two water monitoring sampling strategies for each growing area.

The Adverse Pollution Condition Strategy requires that a minimum of five samples be collected each year under conditions that have historically resulted in elevated coliforms in the particular growing area. The results must be evaluated by adding the individual station sample results to the preexisting bacteriological sampling results to constitute a data set of at least 15 samples for each station. The adverse pollution conditions usually are related to tide, and rainfall, but could be from a point source of pollution or variation could occur during a specific time of the year. Under this strategy, for *Approved* waters, the total coliform median or geometric mean MPN of the water shall not exceed 70 per 100 mL and not more than 10 percent of the samples exceed an MPN of 330 per 100 mL for the 3-tube decimal dilution test. For *Special Restricted* waters, the total coliform median or geometric mean MPN of the water shall not exceed 700 per 100 mL and not more than 10 percent of the samples exceed an MPN of 3300 per 100 mL for the 3-tube decimal dilution test. Areas to be Approved under the Seasonal classification must be sampled and meet the criterion during the time of the year that it is approved for the harvest of shellfish.

The Systematic Random Sampling strategy requires that a random sampling plan be in place before field sampling begins and can only be used in areas that are not affected by point sources of contamination. A minimum of six samples per station are to be collected each year and added to the database to obtain a sample size of 30 for statistical analysis. The bacteriological quality of every sampling station in *Approved* areas shall have a total coliform median or geometric mean MPN not exceeding 70 per 100 mL and the estimated 90th percentile shall not exceed an MPN of 330 per 100 mL. For *Special Restricted* areas, the bacteriological quality shall not exceed a total coliform median or geometric mean MPN of 700 per 100 mL and the estimated 90th percentile shall not exceed an MPN of 3,300 per 100 mL.

Some portions of this area are sampled in accordance with the Adverse Pollution Condition; the remainder is sampled in accordance with the Systematic Random Sampling strategy. Stations 2500 through 2609 (located near Beach Thorofare) and stations 2722 through 3006 (located near Peck Bay) are sampled under the Adverse Pollution Control strategy. Stations 2701 through 2721B (located near the Great

Egg Harbor Bay) are sampled under the Systematic Random Sampling protocol.

MARINE BIOTOXINS

The Department collects samples at regular intervals throughout the summer to determine the occurrence of marine biotoxins. This data is evaluated weekly by the Bureau of Marine Water Monitoring in accordance with the NSSP requirements. An annual report is compiled by the Bureau of Freshwater and Biological Monitoring.

SHORELINE SURVEY

EVALUATION OF BIOLOGICAL RESOURCES

A shoreline survey was done in the area of Anchorage Point. The area of Anchorage Point located near Ship Channel is the area to be upgraded from *Special Restricted* to *Seasonally Approved.* It is noted that there is new construction occuring in this area since it has been connected to the Somers Point Sewage Authority. (See figure 4) Most of the homes appear to be seasonally occupied.

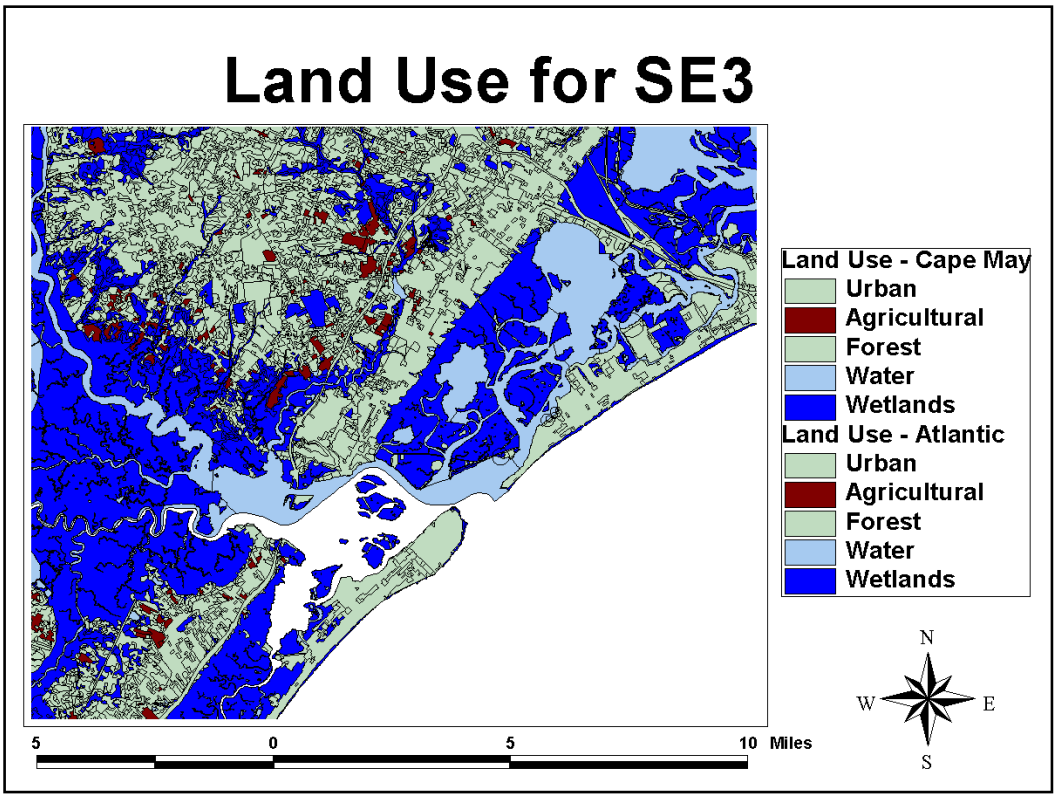
FIGURE 4 : NEW CONSTRUCTION ON ANCHORAGE POINT

LAND USE

This drainage area includes a large amount of wetlands as well as urban development. Figure 5 shows that the majority of the waters are immediately bordered by wetlands. There is also a large portion that is bordered by urban development. All of Ocean City is sewered, therefore lessening the degradation of the waters by septic failures.

The majority of the other municipalities that surround this area such as Somers Point, Ventnor, Margate, and Egg Harbor Township are also sewered. Figure 5 shows the urban development in the aforementioned areas. Waters classified as *Seasonal* allow harvest only during the winter.

FIGURE 5: LAND USE PATTERNS FOR THE GREAT EGG HARBOR AREA



CHANGES SINCE LAST SURVEY

There have been no major changes since the last report dated June 1997.

Marinas

Marina facilities have the potential to affect the suitability of shellfish growing areas for the harvest of shellfish. The biological and chemical contamination associated with marina facilities may be of public health significance. New Jersey defines a marina as "any structure (docks, piers, bulkheads, floating docks, etc.) that supports five or more boats, built on or near the water, which is utilized for docking, storing, or otherwise mooring vessels and usually but not necessarily provides services to vessels such as repairing, fueling, security or other related activities" and designates the confines of the marina as *Prohibited* for the harvest of shellfish. Adjacent waters are classified using a dilution analysis formula.

It is recognized by the NSSP *Guide for the Control of Molluscan Shellfish*, 1997, that there are significant regional differences in all factors that affect marina pollutant loading. The manual therefore allows each state latitude in applying specified occupancy and discharge rates. The NSSP guidelines assume the worst case scenario for each factor.

EQUATION 1 :MARINA BUFFER EQUATION. (ADAPTED FROM FDA. 1989):

$$BufferRadius(ft) = \sqrt{\frac{2x10^{9}(FC/person/day)x2(person/boat)x[(.25slips \geq 24') + (0.065 \times slips < 24')]x2}{140000(FC/M^{3})xdepth(ft)x0.3048(M/ft)xpx2(tides/day)}} x3.28(ft/M)$$

Explanation of terms in equation:

Fecal coliform per person per day:	2×10^{9}
Number of people per boat:	2
For slips able to accommodate boats > 24 feet (combination of factors yields multiplier of 0.25):	
Number of slips occupied:	50%
Number of boats occupied:	50%
For boats < 24':	6.5% discharge waste
Angle of shoreline:	180^{o}, which results in factor of 2
Number of tides per day:	2
Depth in meters:	depth in feet x conversion factor
Water quality to be achieved:	140000 FC/meter ^{3}
Convert meters to feet:	3.28

Marina buffer zones may be calculated using the formula above, or may be determined using a dilution analysis computer program developed by the State of Virginia and the USFDA. The formula above considers only dilution and occupancy rates. The computer program, which is used for complex configurations where the formula is unlikely to provide the needed accuracy, also considers tidal exchange and bacterial die-off. Marina buffer zones were calculated using the formula listed in Equation #1. However, one facility, the Harbor Cove Marina, had the buffer zone calculated using the dilution analysis computer program developed by the State of Virginia and the USFDA. The dilution analysis computer program was used on this marina because of the configuration of the area. The size of each buffer zone is shown in Table 2.

There are 20 marinas in the Great Egg Harbor Estuary, as shown in Table 2. The marinas are located throughout the area, with the largest concentration of marinas located in Ocean City. Figures 6 through 9 show the marina locations with buffer zones. The waters enclosed by the marina are classified as *Prohibited*; depending on the size of the marina and the water quality, water immediately adjacent to each marina may be classified as *Prohibited*, *Special Restricted*, or *Seasonally Approved* (no harvest during summer months when the marina is active).

FIGURE 6: MARINA FACILITIES IN GREAT EGG HARBOR BAY

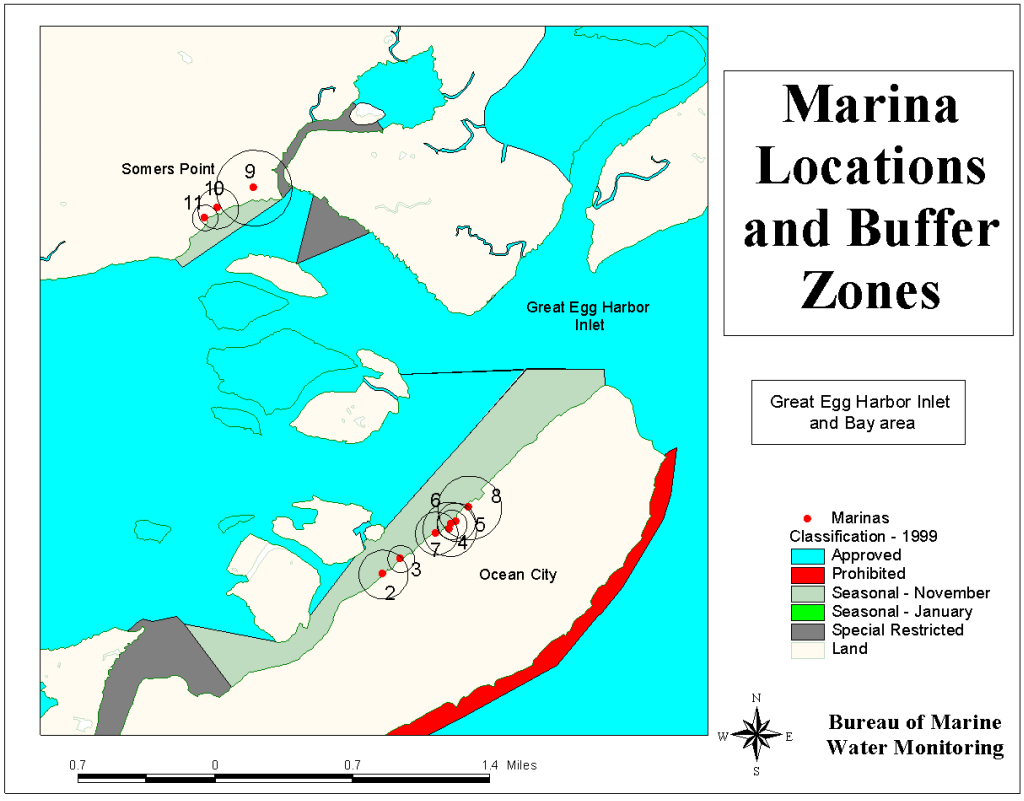


FIGURE 7: MARINA FACILITIES IN LAKES BAY

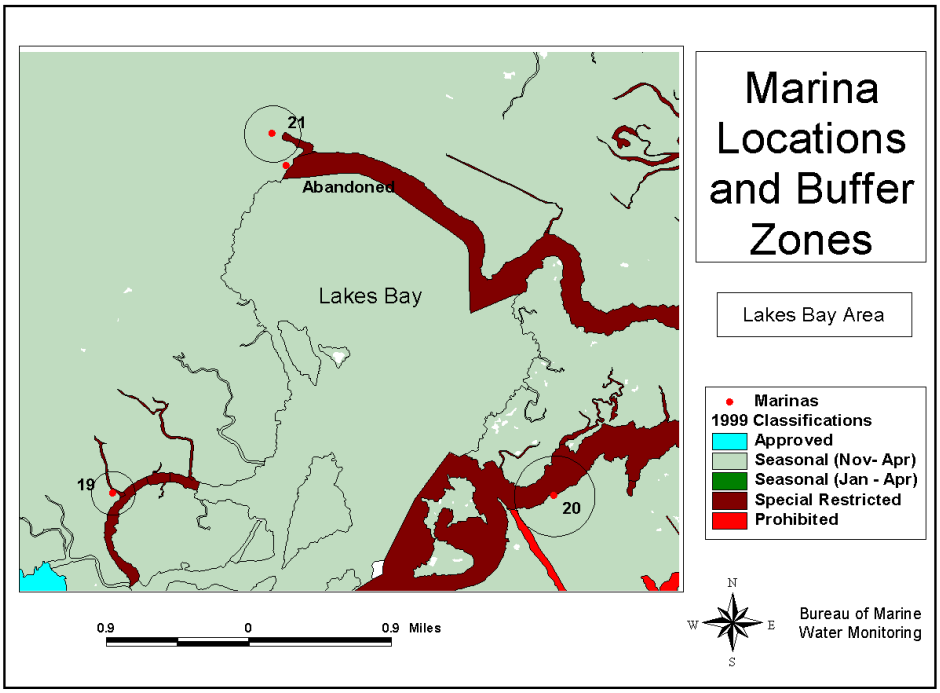


FIGURE 8: MARINA FACILITIES IN BEACH THOROFARE

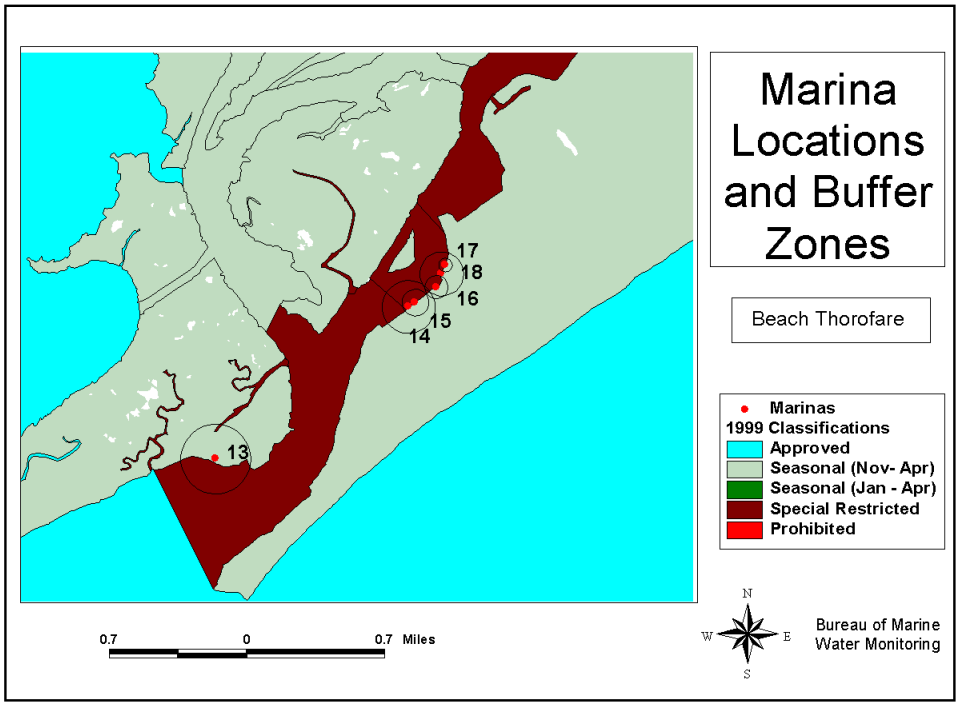


FIGURE 9: HARBOR COVE MARINA

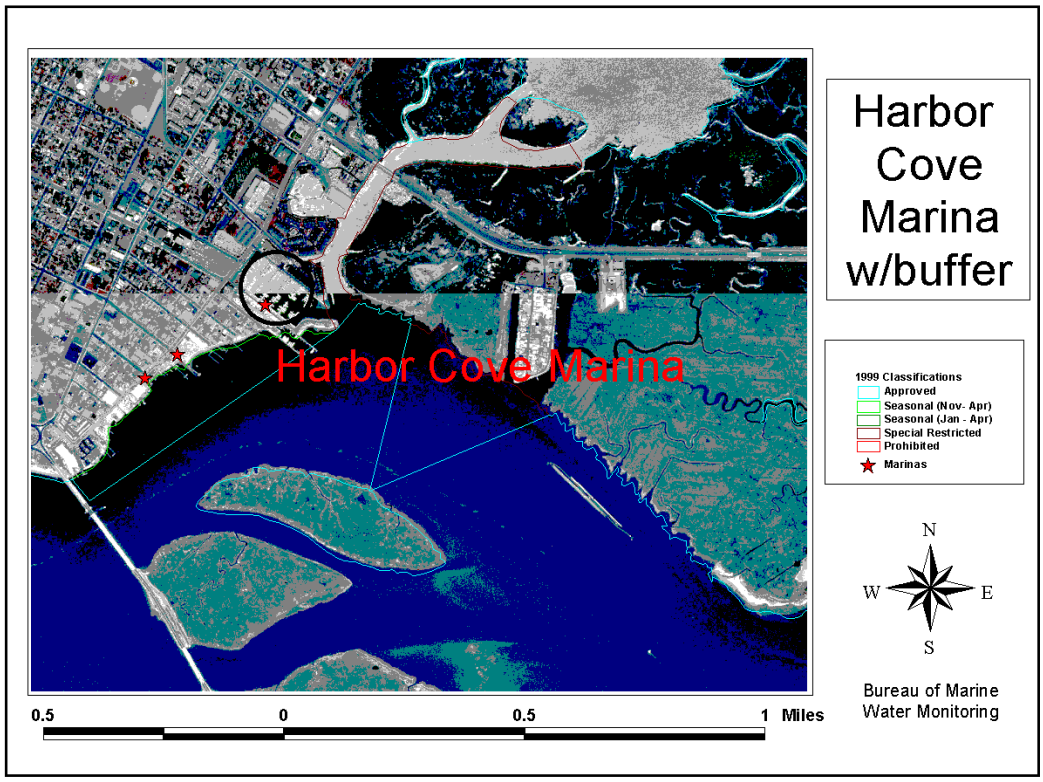


TABLE 2: MARINA FACILITIES LOCATED IN THE GREAT EGG HARBOR ESTUARY

Map Key	Marina Name	# of Slips	Size of Buffer Area (radius; feet)
1	All Seasons Marina	265	3262
2	Noreaster Condo Marina	65	659
3	Bay Villa Marina	20	366
4	Bay View Marina	80	732
5	Lemonts Marina	40	517
6	Ocean City Marina	24	401
7	Bay Club	50	578

Map Key	Marina Name	# of Slips	Size of Buffer Area (radius; feet)
8	Harbor House Marina	110	858
9	Harbor Cove Marina	300	1552
10	Corletto Marina	75	776
11	Bayshore Restaurant Marina	30	491
12	Ocean Reef Condo & Marina	34	369
13	Seaview Harbor Marina	300	940
14	Blue Water Marina	50	708
15	Sunset Bay Marina	32	358
16	Integrity Marina	30	311
17	Ray Scotts Dock	96	183
18	Rossells Docks	32	591
19	Campbells Marina	66	728
20	Crown Key Yacht Club	45	1344
21	Randalls Seafood	11	940

Spills or Other Unpermitted Discharges

There have been no spills in the area that have required a closure of shellfish waters during the period covered by this report.

HYDROGRAPHY AND METEOROLOGY

A detailed hydrography report was completed in the Sanitary Survey Report dated June 1997. Precipitation inputs to the area for the period 1995 through 1997 are shown in Table 3. There have been no significant changes in hydrography since the report dated September 1994. The primary weather station for this area is Atlantic City. The secondary weather station for this area is Pomona. The secondary station data is used when data from the primary station is incomplete.

TABLE 3: CLIMATOLOGICAL DATA

Rainfall Recorded at NOAA's Pomona Station

Sampling Date	Precipitation in Inches			
	Sampling Day	1 Day Prior	2 Days Prior	3 Days Prior
1/19/95	0.000	0.000	0.000.	0.280
1/20/95	0.810	0.810	0.810	0.810
2/16/95	0.110	0.510	0.510	0.510
2/21/95	0.100	0.100	0.100	0.100
2/23/95	0.020	0.020	0.120	0.120
3/02/95	0.000	0.000	0.340	0.340
3/21/95	0.330	0.330	0.330	0.330
3/23/95	0.000	0.070	0.400	0.400
3/30/95	0.010	0.010	0.010	0.010
4/03/95	0.000	0.030	0.030	0.030
4/04/95	0.000	0.000	0.030	0.030
4/10/95	0.030	0.120	0.160	0.160
4/12/95	0.470	0.470	0.500	0.590
4/24/95	0.310	0.310	0.390	0.410
5/01/95	0.010	0.610	0.610	0.610
5/16/95	0.000	0.020	0.290	0.290
6/05/95	0.000	0.000	0.050	0.050
6/12/95	0.190	0.190	0.190	0.190
6/26/95	0.000	0.120	0.140	0.920
7/03/95	0.000	0.180	0.240	0.240
7/17/95	0.370	0.550	0.550	0.550
8/08/95	0.000	0.030	2.980	3.220
8/09/95/	0.000	0.000	0.030	2.980
9/19/95	0.000	0.310	2.360	2.360
9/20/95	0.000	0.000	0.310	2.360
10/04/95	0.000	0.010	0.020	0.020
10/10/95	0.000	0.000	0.010	0.100
10/18/95	0.000	0.000	0.000	1.230

Sampling Date	Precipitation in Inches			
	Sampling Day	1 Day Prior	2 Days Prior	3 Days Prior
10/23/95	0.000	0.000	1.110	1.110
6/04/96	0.690	-0.000	-0.000	-0.000
6/06/96	0.000	0.210	-0.000	-0.000
6/13/96	0.050	-0.000	-0.000	-0.000
7/01/96	0.590	0.640	0.640	0.640
7/16/96	0.430	0.430	0.430	2.400
8/01/96	0.000	0.290	0.330	0.330
8/12/96	0.000	0.000	0.310	0.320
8/19/96	0.000	0.490	0.490	0.490
8/20/96	0.000	0.000	0.490	0.490
8/21/96	0.000	0.000	0.000	0.490
9/09/96	0.010	0.010	0.010	0.010
9/11/96	0.040	0.040	0.050	0.050
9/16/96	0.000	0.000	0.010	0.140
10/04/96	0.000	0.000	0.000	0.010
10/08/96	0.630	0.630	0.630	0.630
10/21/96	0.080	0.830	-0.000	-0.000
11/07/96	0.020	0.020	0.020	0.020
11/13/96	0.000	0.000	0.000	0.010
11/20/96	0.000	0.160	0.160	0.160
12/02/96	0.790	0.810	0.810	0.810
12/10/96	0.000	0.040	1.260	1.340
12/13/96	0.350	0.390	0.390	0.390
12/16/96	0.000	0.240	1.540	1.890
12/17/96	0.200	0.200	0.440	1.740
1/09/97	0.020	0.020	0.020	0.020
1/13/97	0.000	0.000	0.080	0.430
1/30/97	0.000	0.510	0.670	0.670
2/03/97	0.000	0.000	0.120	0.120
2/06/97	0.240	1.220	1.220	1.220
2/11/97	0.080	0.080	0.320	0.340
2/25/97	0.000	0.000	0.040	0.050
2/26/97	0.000	0.000	0.000	0.040
3/05/97	0.000	1.300	1.580	1.740
3/10/97	0.510	0.510	0.510	0.510
3/20/97	0.120	0.200	.0200	0.200
4/07/97	0.240	0.280	0.280	0.280
4/08/97	0.000	0.240	0.280	0.280
4/16/97	0.000	0.000	0.000	0.000
4/29/97	0.000	1.650	1.650	1.650
5/05/97	0.000	0.040	0.160	0.200
5/06/97	0.020	0.020	0.060	0.180
5/08/97	0.000	0.200	0.220	0.220
5/19/97	0.000	0.000	0.000	0.040
6/02/97	0.590	0.790	1.030	1.050
6/13/97	0.020	0.020	0.020	0.020
6/17/97	0.000	0.000	0.000	0.550

Sampling Date	Precipitation in Inches			
	Sampling Day	1 Day Prior	2 Days Prior	3 Days Prior
6/27/97	0.120	0.120	0.120	0.120
8/19/97	0.390	-0.000	-0.000	-0.000
9/02/97	0.000	0.010	0.020	0.020
9/15/97	0.000	0.000	0.000	0.010
9/23/97	0.000	0.000	0.550	0.550
10/06/97	0.000	0.040	0.040	0.830
10/15/97	0.120	0.120	0.120	0.120
10/20/97	0.310	0.390	0.550	0.550
10/29/97	0.000	0.010	0.800	0.810
11/03/97	0.080	0.830	0.850	0.850
11/10/97	0.080	0.630	1.180	1.300
11/19/97	0.000	0.000	0.000	0.040
12/03/97	0.000	0.000	0.280	0.280
12/11/97	0.040	0.350	0.350	0.350
12/15/97	0.000	0.000	0.000	0.020

There were no stations that showed a correlation with rainfall. A designation of "-0.000" indicates that no data was available for that date from either weather station. Although precipitation data was not available after 12/15/97, there is no reason to suspect that the effect of precipitation would have been significantly different at those times than at any other time. Therefore, the analysis was completed without that data.

WATER QUALITY STUDIES

BACTERIOLOGICAL QUALITY

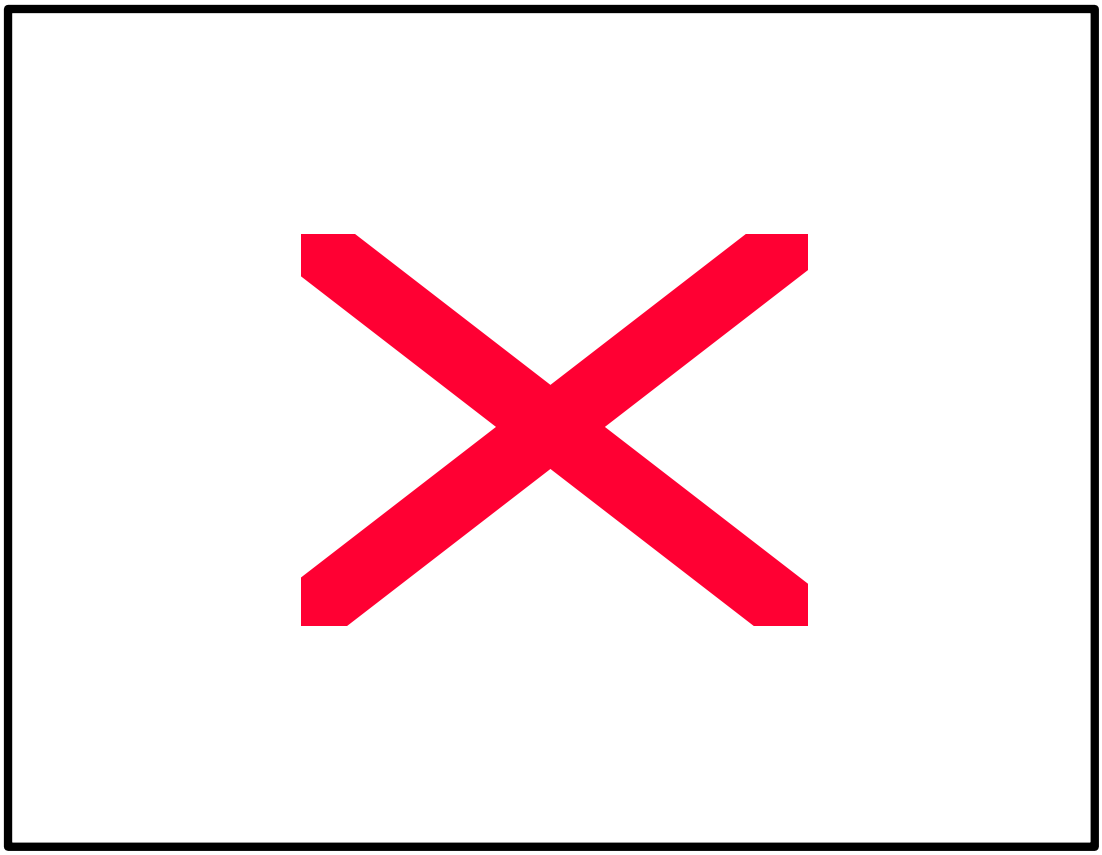
A significant tidal component to water quality showed up in 9 stations in this area, (see Table 4 and Figure 10). The geometric mean total coliform levels were significantly higher during flood tide. Stations 2502B and 2532, located in Beach Thorofare, are not included in the chart. Since only 4 and 3 samples were obtained respectively on the flood tide, there was insufficient data to evaluate statistically. The remaining stations were located in the Great Egg Harbor Bay area. At the time of the report done in June 1997, there were 5 stations that showed a significant correlation to the flood tide. Four of these five stations were also located in the Great Egg Harbor Bay area. These stations still represent less than 6% of the stations in the area, therefore, not justifying the need for this area to be listed as a tidal priority.

Table 4. T-test comparing total coliform MPN values for Tidal Influence

Stations	Geometric Mean Total Coliform MPN	Prob>[T]

	Ebb	# Samples	Flood	# Samples	
2511B	16.6	13	5.5	14	0.003
2706A	7.8	23	19.2	20	0.044
2706B	6.5	22	15.1	21	0.015
2712D	3.7	25	10.0	19	0.002
2713C	4.6	29	15.1	15	0.007
2715	5.1	15	11.4	29	0.013
2717	4.4	29	10.3	15	0.034
2718C	4.4	29	16.4	15	0.002
2721A	5.4	29	13.0	15	0.021

FIGURE 10:STATIONS WITH A TIDAL INFLUENCE

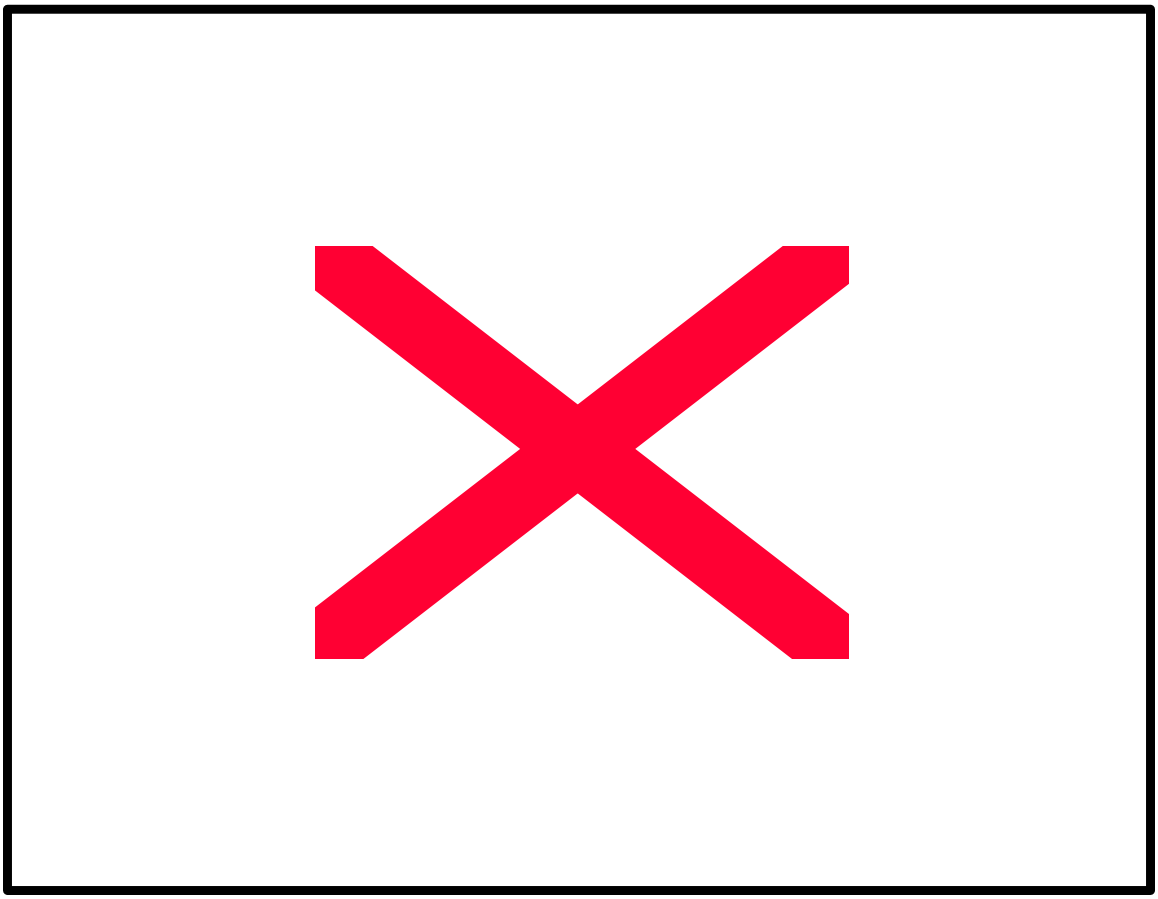


There were fifteen stations that showed a significant seasonality to water quality. However, only one station had enough samples taken in the summer and the winter to make a statistically significant determination. Station 2710F, (seen in Table 5 and Figure 11), located in Ship Channel had 21 samples taken in the summer and 31 samples taken in the winter. This station showed a higher total coliform geometric mean during the summer months. The seasonal data supports the determination to upgrade this area in Ship Channel from *Special Restricted* to *Seasonally Approved*.

Table 5. T-test comparing total coliform MPN values for winter versus summer runs.

Station	**Geometric Mean Total Coliform MPN**		**Prob>[T}**
	Summer	**Winter**	
2710F	18.2	6.7	0.0214

FIGURE 11: STATIONS WITH A SEASONAL INFLUENCE



There are approximately 170 sampling stations that are monitored each year. Figures 12, 13, 14 and 15 show the shellfish water quality monitoring stations.

FIGURE 12: SAMPLING STATIONS FOR THE GREAT EGG HARBOR ESTUARY

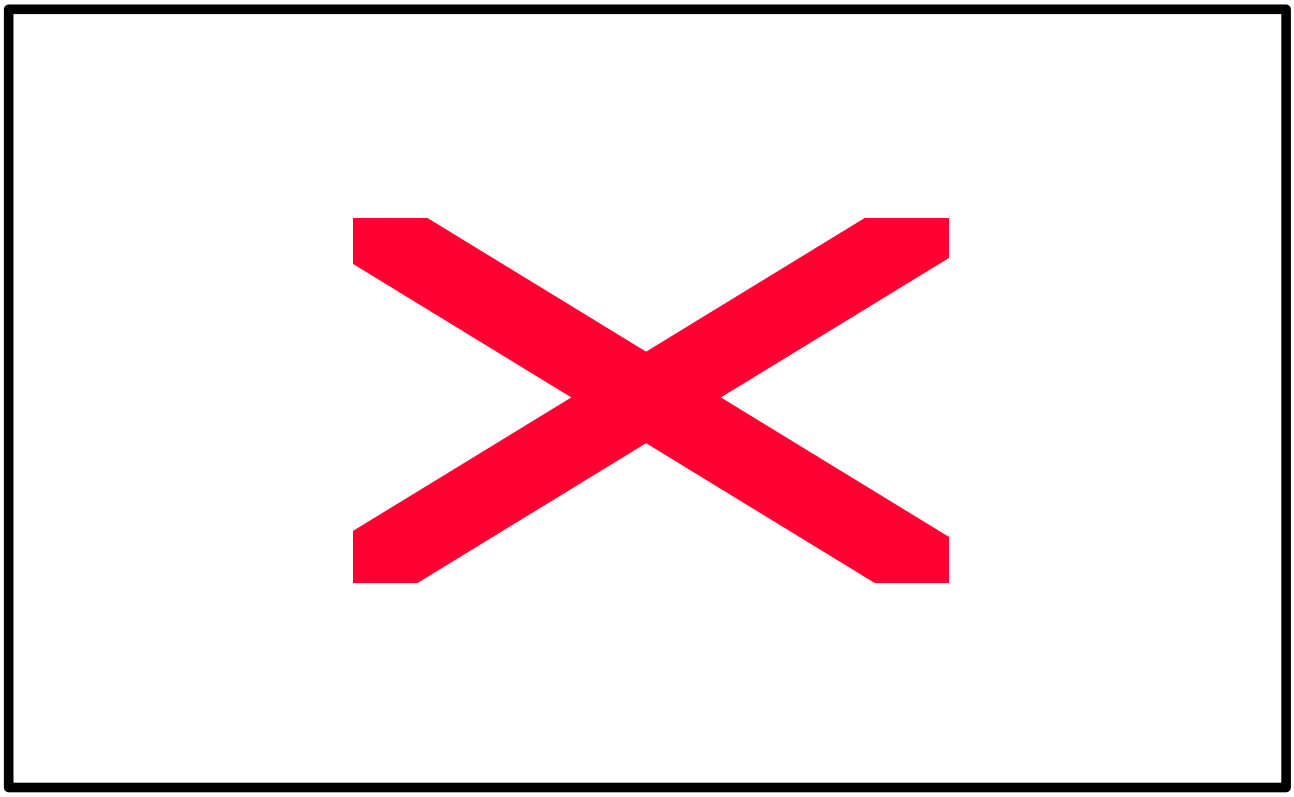


FIGURE 13: SAMPLING STATION IN THE GREAT EGG HARBOR ESTUARY

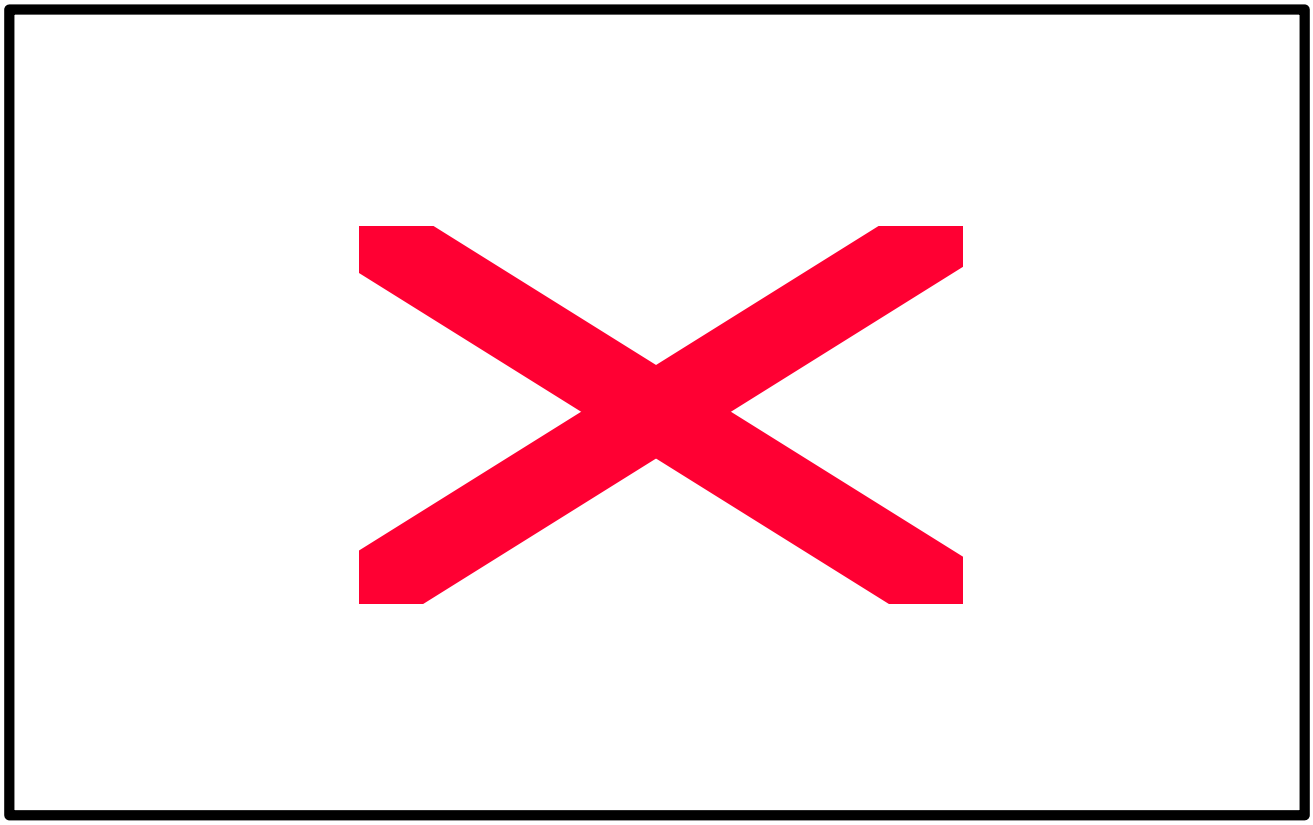


FIGURE 14:SAMPLING STATIONS IN THE GREAT EGG HARBOR ESTUARY

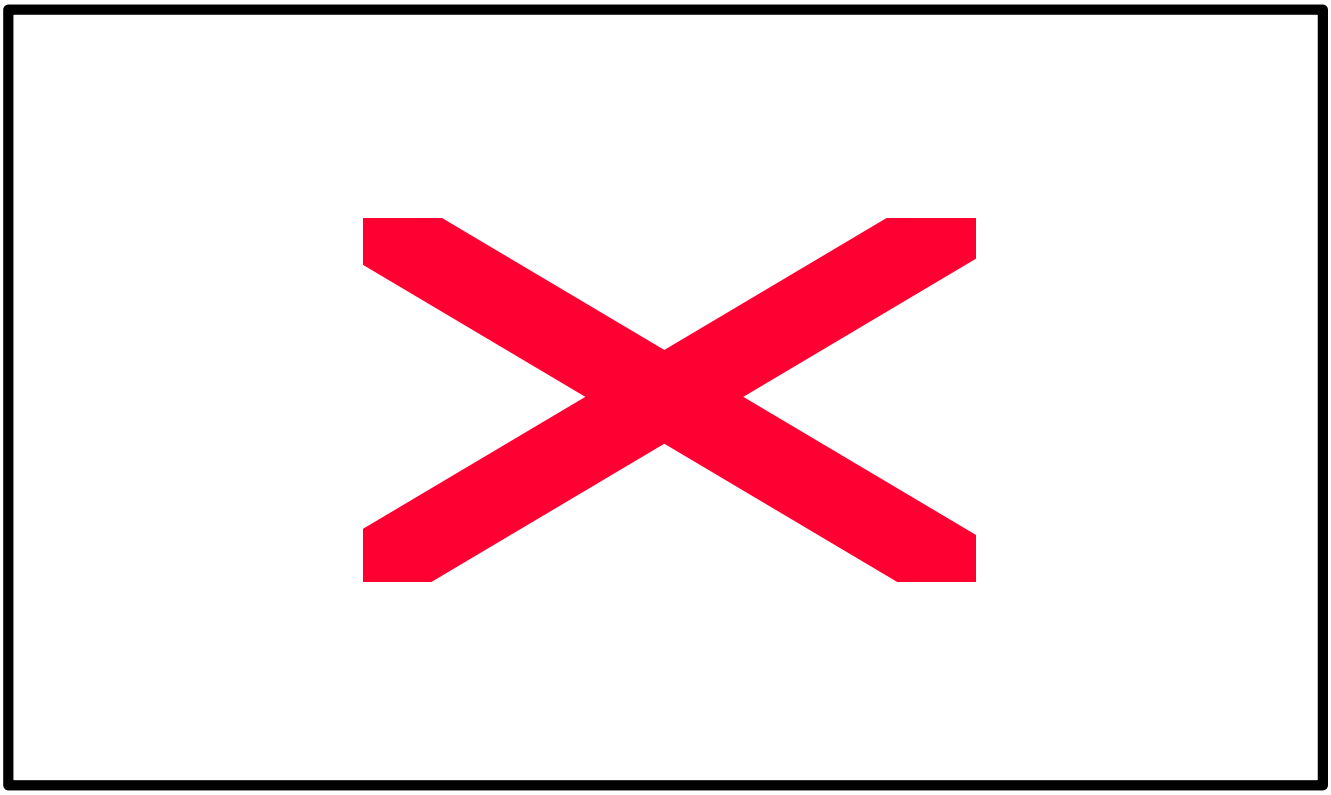
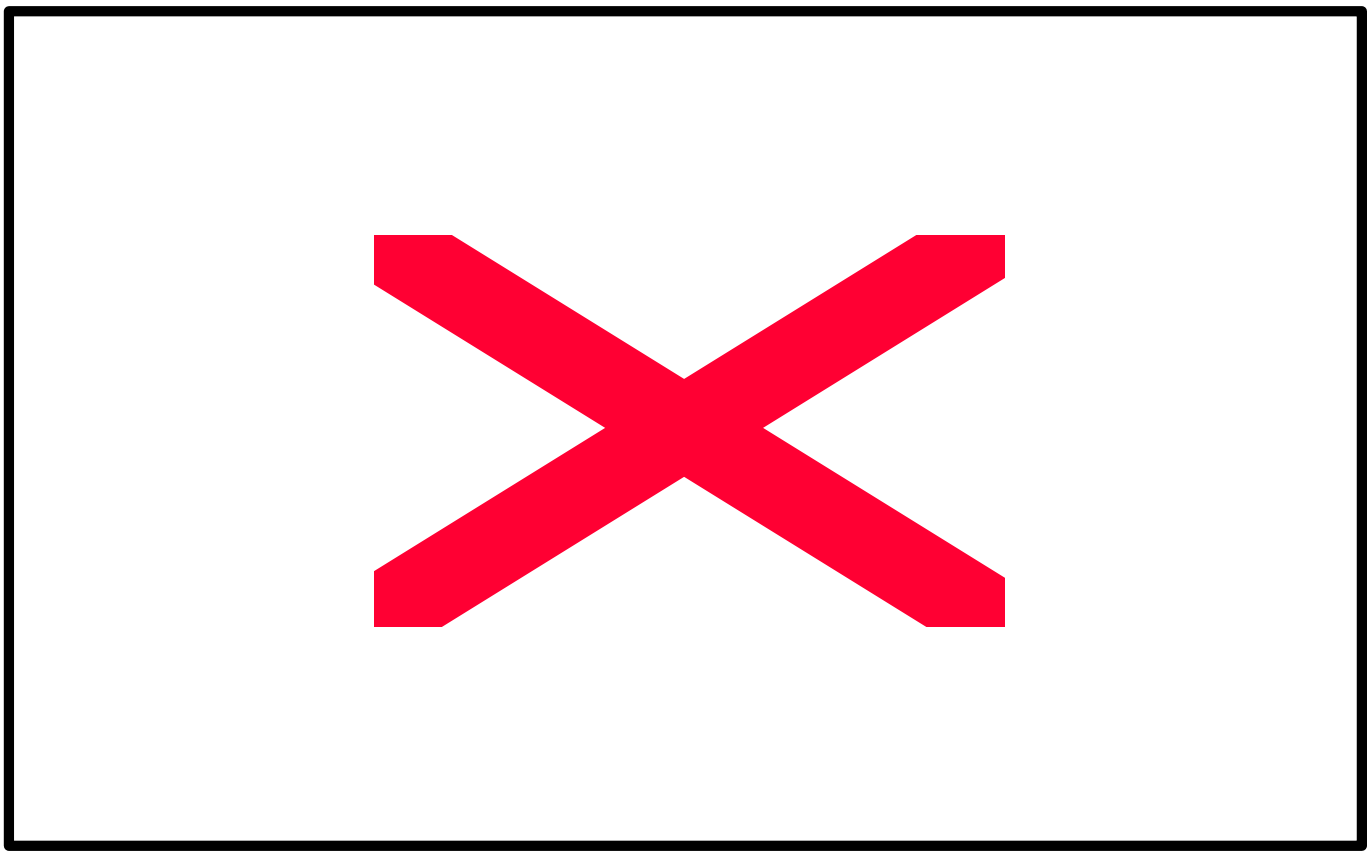


FIGURE 15: SAMPLING STATIONS FOR THE GREAT EGG HARBOR ESTUARY



CONCLUSIONS

BACTERIOLOGICAL EVALUATION

The water quality in the Great Egg Harbor estuary has been good with 100% of the stations in compliance with the existing water quality classification. The area that required a change was located at Ship Channel. This area is presently classified as *Special Restricted* waters. (See Figure 16). As a result of the homes on Anchorage Point being connected to the Somers Point Sewage Authority the *Special Restricted* area will be upgraded to *Seasonally Approved*, November 1 through April 30. (See Figure 17).

FIGURE 16: CURRENT CLASSIFICATION FOR SHIP CHANNEL

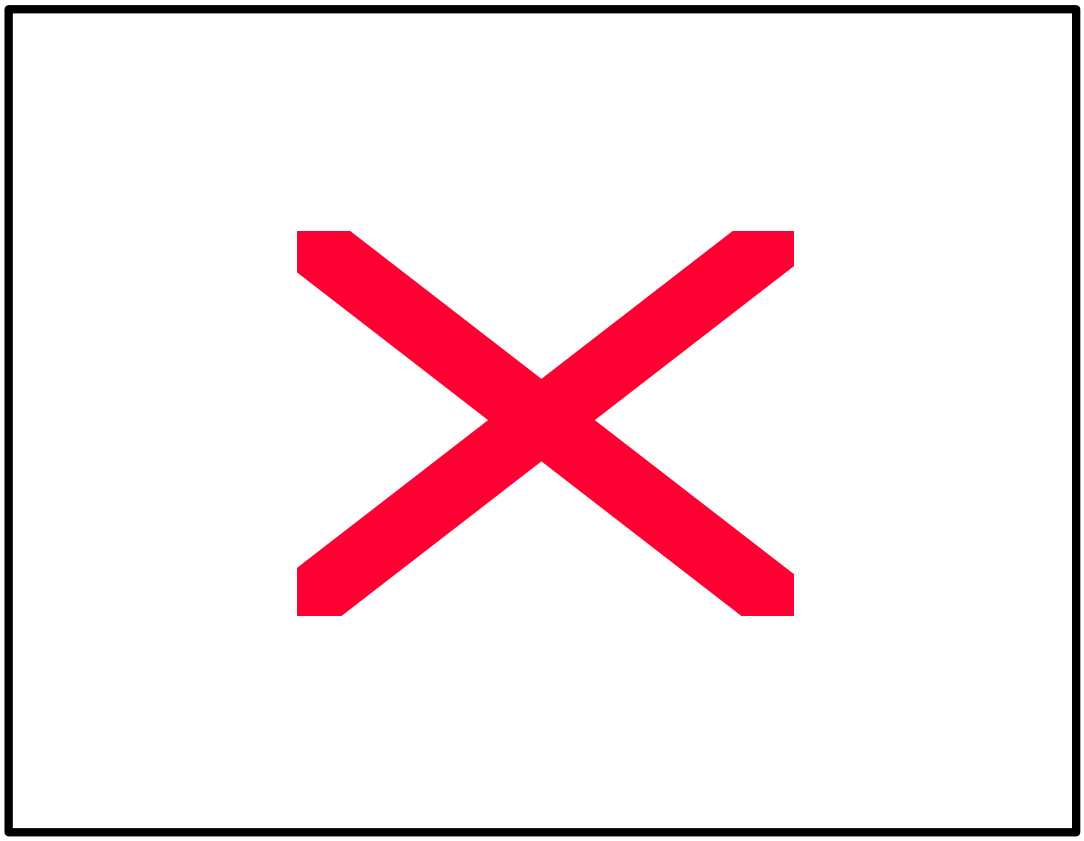
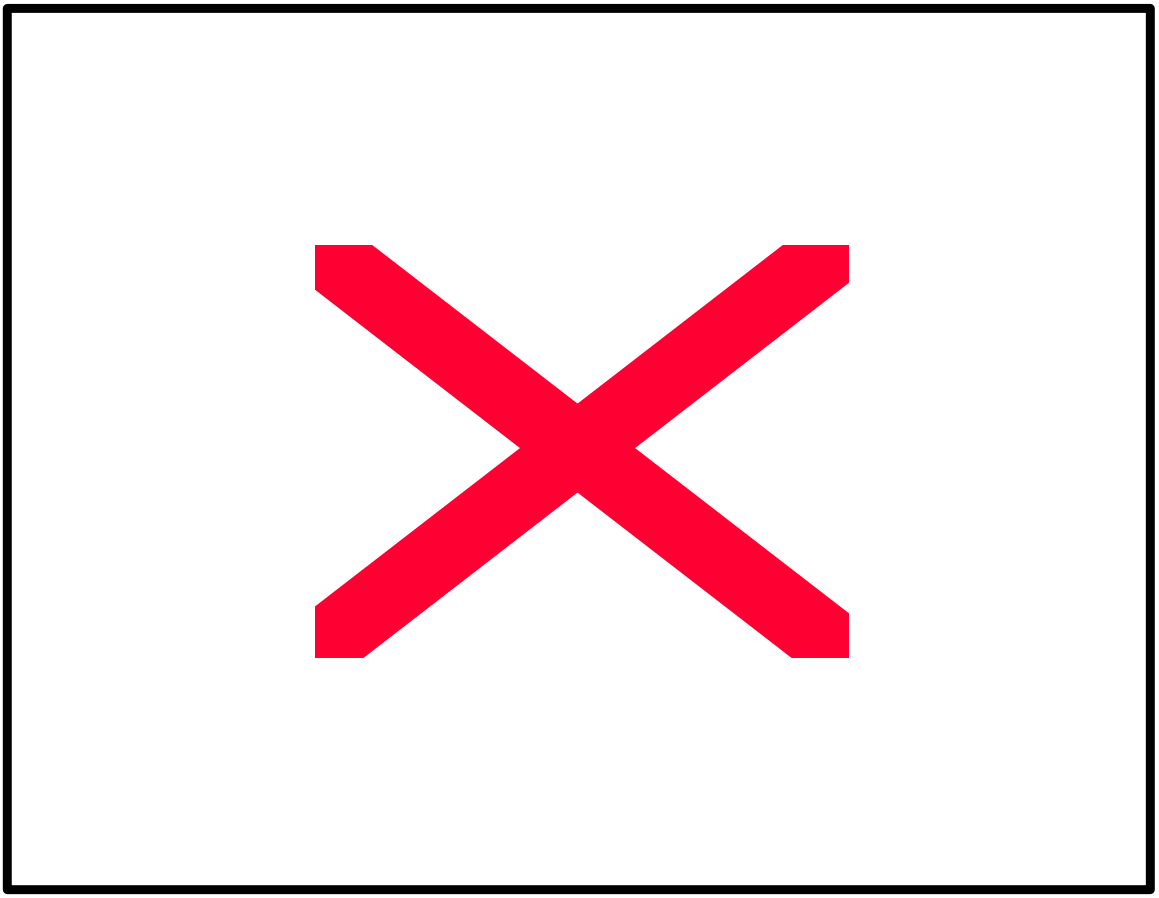


FIGURE 17: RECOMMENDED CHANGES IN CLASSIFICATION FOR SHIP CHANNEL



RECOMMENDATIONS

Legal Description for Recommended Changes:

Recommended Changes in Monitoring Schedule

More summer monitoring is recommended in the area of Risley Channel. This could allow for the possible upgrade of waters in the channel from *Seasonal* to *Approved.* Additionally, more yearround sampling is recommended in the area of Beach Thorofare to allow for possible upgrades in the future.

RECOMMENDATIONS FOR THE GREAT EGG HARBOR ESTUARY

The recommended change allows 38 acres of *Special Restricted* water to be changed to *Seasonally Approved* waters. This recommendation would require N.J.A.C. 7:12-3.2(a)25vii to read as follows:

[vii. All those waters in Ship Channel within a line bearing approximately 190 degrees T through a Department maintained marker on the northern shore of Ship Channel approximately 1,000 feet west of the mouth of the Anchorage Point Lagoon, to another Department maintained marker on the southern shore of Ship Channel, then bearing approximately 066 degrees T to another Department maintained marker which is approximately 1,000 feet east of the mouth of the Anchorage Point Lagoon, then proceeding northwesterly along the shoreline of Ship Channel, across the mouth of the Anchorage Point Lagoon and to the point of origin at the Department maintained marker.]

It would also require N.J.A.C. 7:12-4.1(a)8 to read as follows:

i. (No Change)

ii. [(Reserved)] All those waters in Ship Channel within a line bearing approximately 190 degrees T through a Department maintained marker on the northern shore of Ship Channel approximately 1,000 feet west of the mouth of the Anchorage Point Lagoon, to another Department maintained marker on an unnamed island on the southern shore of Ship Channel, then bearing approximately 066 degrees T to another Department maintained marker which is approximately 1,000 feet east of the mouth of the Anchorage Point Lagoon, then proceeding northwesterly along the shoreline of Ship Channel, across the mouth of the Anchorage Point Lagoon and to the point of origin at the Department maintained marker

iii. [All the waters of Peck Bay contained within a line from the base of the 34th Street Bridge (Ocean City) and continuing along the Ocean City shoreline in a northeasterly direction to a Department maintained marker, then bearing approximately 295 degrees T to another Department maintained marker on the mainland, then along the shoreline in a southerly direction to the base of the 34th Street Bridge and across the bridge to the point of origin and terminating.] . All the waters of Ship Channel contained within a line from the base of Somers Point – Ocean City Bridge in Somers Point then along the bridge to the northern end of the bascule, then bearing approximately 056 degrees T to Flashing light “1” (Fl “1”), then bearing approximately 310 degrees T to a point of intersection with the shoreline of Ship Channel, then proceeding westerly along the shoreline of Ship Channel to the point of origin at the base of the Somers Point-Ocean City Bridge terminating.

iv. (No Change)

v. [All of the waters of Ship Channel within a line bearing approximately 246 degrees T through a Department

maintained marker located on the northern shore of Ship Channel approximately 1,000 feet from the mouth of the Anchorage Point Lagoon to another Department maintained marker located on the southern shore of Ship Channel, then bearing approximately 135 degrees T to another Department maintained marker on the southern shore of Ship Channel, then bearing approximately 083 degrees T to buoy GC "251" then bearing approximately 313 degrees T to another Department maintained marker at the eastern end of Anchorage Point, then proceeding along the shoreline of Ship Channel to the point of origin approximately 1,000 feet from the mouth of the Anchorage Point Lagoon.]All the waters of Peck Bay contained within a line from the base of the 34th Street Bridge (Ocean City) and continuing along the Ocean City shoreline in a northeasterly direction to a Department maintained marker, then bearing approximately 295 degrees T to another Department maintained marker on the mainland, then along the shoreline in a southerly direction to the base of the 34th Street Bridge and across the bridge to the point of origin and terminating.

vi. (No Change)

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APPENDICES

NOTE: THIS IS THE ORDER I EXPECT FOR DATA LISTING

A. Statistical Summaries

- Yearround
- Winter Only
- Summer Only

B. Seasonal Evaluation

C. Precipitation

- Rainfall Correlation
- Cumulative Rainfall
- Wet Weather Statistical Summary
- Dry Weather Statistical Summary

D. Tidal Evaluation

E. Data Listing - 1995 through 1998